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CASSADAGA LAKE, CHAUTAUQUA COUNTY, NEW YORK

Pacific Northwest Environmental Research Laboratory

Prepared for:

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New York State Department of Environmental Conservation
New York National Guard

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16. ABSTRACT
Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivded according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

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I

REPORT
ON
CASSADAGA LAKE
CHAUTAUQUA COUNTY
NEW YORK

EPA REGION II

WORKING PAPER No. 152

WITH THE COOPERATION OF THE

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

AND THE

NEW YORK NATIONAL GUARD

DECEMBER, 1974

II

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F O R E W O R D

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the New York Department of Environmental Conservation for professional involvement and to the New York National Guard for conducting the tributary sampling phase of the Survey.

Henry L. Diamond, Commissioner of the New York Department of Environmental Conservation, and Leo J. Hetling, Director, and Italo G. Carcich, Senior Sanitary Engineer, Environmental Quality Research, Department of Environmental Conservation, provided invaluable lake documentation and counsel during the Survey.

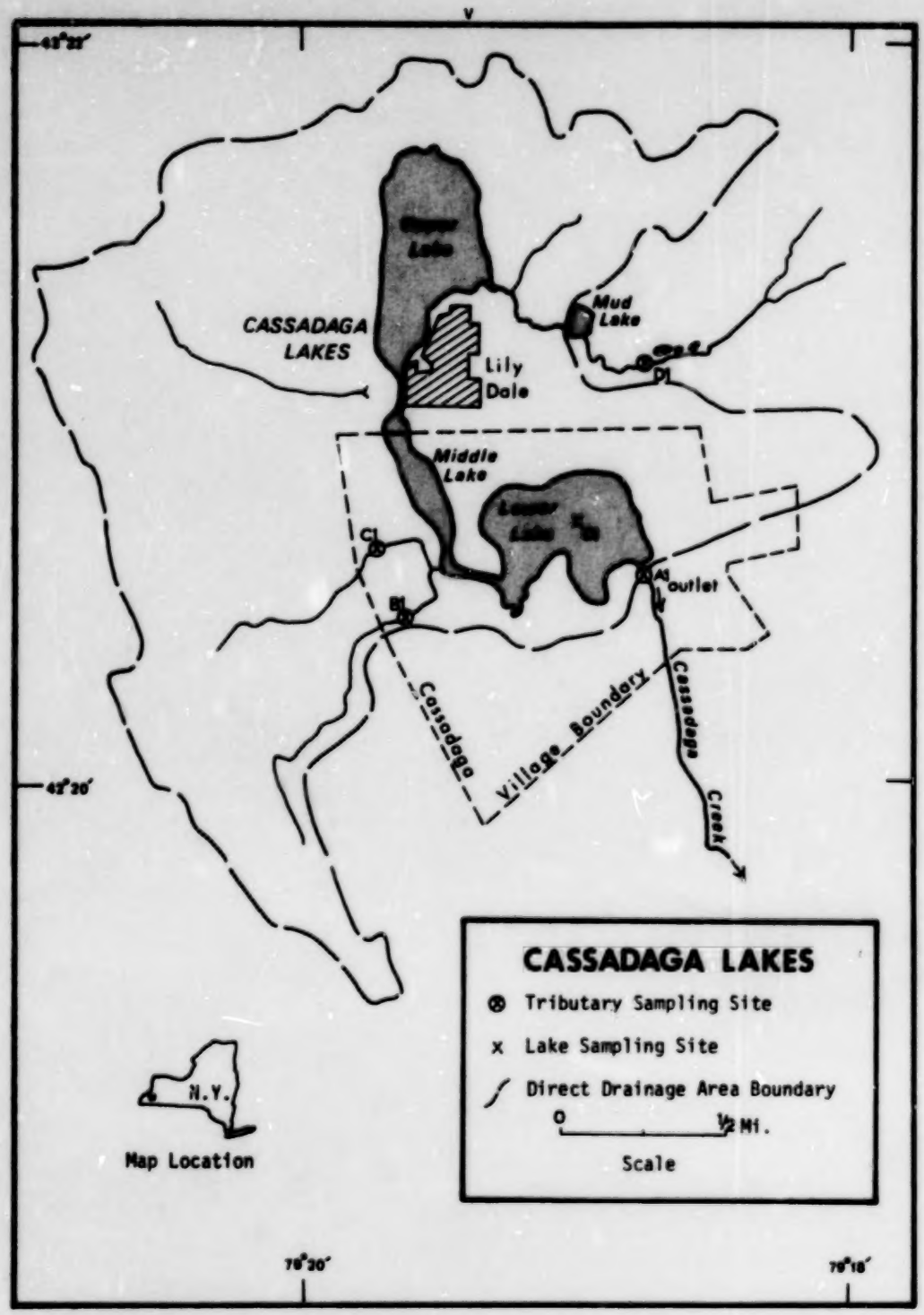
Major General John C. Baker, the Adjutant General of New York, and Project Officer Lieutenant Colonel Fred Peters, who directed the volunteer efforts of the New York National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF NEW YORK

LAKE NAME	COUNTY
Allegheny Reservoir	Cattaraugas, NY; McLean, Warren, PA
Black	St. Lawrence
Canadaigua	Ontario
Cannonsville	Delaware
Carry Falls	St. Lawrence
Cassadaga	Chautauqua
Cayuga	Seneca, Tompkins
Champlain	Clinton, Essex, NY; Addison, Chittenden, Franklin, VT
Chautauqua	Chautauqua
Conesus	Livingston
Cross	Cayuga, Onondaga
Goodyear	Otsego
Huntington	Sullivan
Keuka	Ontario
Long	Hamilton
Lower St. Regis	Franklin
Otter	Cayuga
Owasco	Cayuga
Raquette Pond	Franklin
Round	Saratoga
Sacandaga Res.	Fulton, Saratoga
Saratoga	Saratoga
Schroon	Essex, Warren
Seneca	Seneca, Schyler, Yates
Swan	Sullivan
Swinging Bridge Res.	Sullivan


42°22'
42°20'
78°20'
78°18'
Upper Lake
Mud Lake
CASSADAGA LAKES
Lily Dale
D1
Middle Lake
Lower Lake
C1
B1
A1
outlet
Cassadaga Village Boundary
Cassadaga Creek
N.Y.
Map Location
CASSADAGA LAKES
Tributary Sampling Site
Lake Sampling Site
Direct Drainage Area Boundary
0
½ Mi.
Scale

CASSADAGA LAKE

STORET NO. 3607

I. CONCLUSIONS

A. Trophic Condition:

Survey data show that Cassadaga Lake is eutrophic. Of the 26 New York lakes surveyed in the fall of 1972, when essentially all were well-mixed, 14 had less mean total phosphorus, 12 had less mean dissolved phosphorus, and 17 had less mean inorganic nitrogen. For all New York data, 10 lakes had greater Secchi disc transparency, and 16 had less mean chlorophyll a.

B. Rate-Limiting Nutrient:

The results of the algal assay indicate that Cassada Lake was phosphorus limited at the time the sample was collected. The lake data also indicate phosphorus limitation; i.e., N/P ratios were greater than 14/1 on all occasions, and phosphorus limitation would be expected.

C. Nutrient Controllability:

1. Point sources--During the sampling year, Cassadaga Lake is estimated to have received a total phosphorus load at a rate of 7.1 lbs/acre/yr or 0.80 $g/m^2/yr$. Of this load, it is estimated that the Village of Lily Dale contributed nearly 67%.

Now the mean depth and, hence, the volume and mean hydraulic retention time of the lake are not known; but, based on Vollenweider's model (in press), it is calculated that the loading rate

would have to be reduced to 0.62 $g/m^2/yr$ to equal a "dangerous" or eutrophic rate (see page 12).

If the estimate of the phosphorus load from the Lily Dale waste treatment facility is reasonable, it is calculated that 80% phosphorus removal at the Lily Dale waste treatment facility would reduce the loading rate to 2.8 lbs/acre/yr or 0.32 $g/m^2/yr$ (assuming the State-wide ban on phosphorus in detergents reduces the phosphorus load to the facility by 50%).

The reduced loading would approximate Vollenweider's oligotrophic rate and should result in a significant improvement in the trophic condition of Cassadaga Lake.

2. Non-point sources (see page 12)--The phosphorus exports of the Cassadaga Lake tributaries were similar to the exports of the tributaries to nearby Chautauqua Lake*. In all, it is estimated that non-point sources contributed about 33% of the total phosphorus load to the lake during the sampling year.

* Working Paper No. 155.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS

A. Lake Morphometry:

1. Surface area: 211 acres†.
2. Mean depth: unknown.
3. Maximum depth: >25 feet.
4. Volume: unknown.
5. Mean hydraulic retention time: unknown.

B. Tributary and Outlet:
(See Appendix A for flow data)

1. Tributaries -

Name	Drainage area*	Mean flow*
Unnamed Creek (B-1)	0.3 mi^2	0.6 cfs
Unnamed Creek (C-1)	0.5 mi^2	0.8 cfs
Unnamed Creek (D-1)	2.9 mi^2	4.8 cfs
Minor tributaries & immediate drainage -	2.0 mi^2	3.8 cfs
Totals	5.7 mi^2	10.0 cfs

2. Outlet -

Cassadaga Creek	6.0 mi^2**	10.0 cfs

C. Precipitation***:

1. Year of sampling: 47.2 inches.
2. Mean annual: 36.8 inches.

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† Greeson and Robison, 1970.
* Drainage areas are accurate within ±5%, except for small basins (±10%); mean daily flows are accurate within ±5 to 25%; and normalized mean monthly flows are accurate within ±15%.
** Includes area of lake.
*** See Working Paper No. 1, "Survey Methods".

III. LAKE WATER QUALITY SUMMARY

Cassadaga Lake was sampled three times during the open-water season of 1972 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from one station on the lake and from a number of depths at that station (see map, page v). During each visit, a single depth-integrated (15 feet to surface) sample was collected for phytoplankton identification and enumeration; and during the last visit, a single five-gallon depth-integrated sample was collected for algal assays. Also each time, a depth-integrated sample was collected from the station for chlorophyll a analysis. The maximum depth sampled was 25 feet.

The results obtained are presented in full in Appendix B, and the data for the fall sampling period, when the lake essentially was well-mixed, are summarized below. Note, however, the Secchi disc summary is based on all values.

For differences in the various parameters at the other sampling times, refer to Appendix B.

A. Physical and chemical characteristics:

Parameter	Minimum	Mean	Median	Maximum
		FALL VALUES (10/13/72)		
Temperature (Cent.)	11.6	11.8	11.8	11.9
Dissolved oxygen (mg/l)	4.3	5.4	4.8	7.1
Conductivity (μmhos)	200	203	203	205
pH (units)	7.4	7.5	7.5	7.6
Alkalinity (mg/l)	82	84	84	85
Total P (mg/l)	0.026	0.034	0.032	0.048
Dissolved P (mg/l)	0.009	0.011	0.011	0.014
NO_2 + NO_3 (mg/l)	0.120	0.125	0.125	0.130
Ammonia (mg/l)	0.290	0.347	0.340	0.420
		ALL VALUES		
Secchi disc (inches)	52	101	72	180

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Number per ml
05/26/72	1. Dinobyron	376
	2. Cyclotella	221
	3. Cryptomonas	156
	4. Schroederia	148
	5. Achnanthes	18
	Other genera	50
	Total	969
07/27/72	1. Chroococcus	7,717
	2. Anabaena	1,123
	3. Cryptomonas	1,087
	4. Cyclotella	507
	5. Dinobryon	109
	Other genera	327
	Total	10,870
10/13/72	1. Cyclotella	2,214
	2. Fragilaria	482
	3. Flagellates	482
	4. Anabaena	181
	5. Achnanthes	151
	Other genera	737
	Total	4,247

2. Chlorophyll a -
(Because of instrumentation problems during the 1972 sampling, the following values may be in error by plus or minus 20 percent.)

Sampling Date	Station Number	Chlorophyll a (µg/l)
05/26/72	01	1.1
07/27/72	01	21.8
10/13/72	01	6.2

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.015	0.397	4.4
0.010 P	0.025	0.397	9.2
0.020 P	0.035	0.397	11.2
0.050 P	0.065	0.397	11.9
0.050 P + 5.0 N	0.065	5.397	30.3
0.050 P + 10.0 N	0.065	10.397	31.7
10.0 N	0.015	10.397	4.6

2. Discussion -

The control yield of the assay alga, Selenastrum capricornutum, indicates that the potential primary productivity was high at the time the sample was collected. Also, the increased yields with increased orthophosphorus, and the lack of response when only nitrogen was added, indicates that the lake was phosphorus limited when sampled.

The lake data indicate phosphorus limitation at the other sampling times as well. The N/P ratios were 16/1 or higher, and phosphorus limitation would be expected.

IV. NUTRIENT LOADINGS
(See Appendix C for data)

For the determination of nutrient loadings, the New York National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff months of April, May, and June, when two samples were collected. Sampling was begun in November, 1972, and was completed in October, 1973.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the New York District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*. Nutrient loadings for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the means of the nutrient loads, in $lbs/mi^2/year$, at stations B-1, C-1, and D-1 and multiplying the means by the ZZ area in mi^2.

Nutrient loadings from the septic tank serving the Village of Lily Dale were estimated at 2.5 lbs P and 7.5 lbs N/capita/year.

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* See Working Paper No. 1.

A. Waste Sources:

1. Known municipal* -

Name	Pop. Served	Treatment	Mean Flow (mgd)	Receiving Water
Lily Dale	400	primary (septic tank)	0.040**	Cassadaga Lake

2. Known industrial - None

* Anonymous, 1971.
** Estimated at 100 gal/capita/day.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr	% of total
a. Tributaries (non-point load) -		
Unnamed Creek (B-1)	30	2.0
Unnamed Creek (C-1)	20	1.3
Unnamed Creek (D-1)	260	17.3
b. Minor tributaries & immediate drainage (non-point load) -	150	10.0
c. Known municipal -		
Lily Dale	1,000	66.7
d. Septic tanks* -	10	0.7
e. Known industrial - None	-	-
f. Direct precipitation** -	30	2.0
Total	1,500	100.0

2. Outputs -

Lake outlet - Cassadaga Creek 560

3. Net annual P accumulation - 940 pounds.

* Estimate based on 12 lakeshore dwellings; see Working Paper No. 1.
** See Working Paper No. 1.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/ yr	% of total
a. Tributaries (non-point load) -		
Unnamed Creek (B-1)	930	3.2
Unnamed Creek (C-1)	1,270	4.3
Unnamed Creek (D-1)	14,810	50.2
b. Minor tributaries & immediate drainage (non-point load) -	7,160	24.3
c. Known municipal -		
Lily Dale	3,000	10.2
d. Septic tanks* -	280	0.9
e. Known industrial - None	-	-
f. Direct precipitation** -	2,030	6.9
Total	29,480	100.0

2. Outputs -

Lake outlet - Cassadaga Creek 23,980

3. Net annual N accumulation - 5,504 pounds

* Estimate based on 12 lakeshore dwellings; see Working Paper No. 1.
** See Working Paper No. 1.

D. Mean Annual Non-point Nutrient Export by Subdrainage Area:

Tributary	lbs P/mi^2/yr	lbs N/mi^2/yr
Unnamed Creek (B-1)	100	3.100
Unnamed Creek (C-1)	40	2,540
Unnamed Creek (D-1)	90	5,107

E. Yearly Loading Rates:

In the following table, the existing phosphorus loading rates are compared to those proposed by Vollenweider (in press). Essentially, his "dangerous" rate is the rate at which the receiving water would become eutrophic or remain eutrophic; his "permissible" rate is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic rate would be considered one between "dangerous" and "permissible".

	Total Phosphorus		Total Nitrogen	
Units	Total	Accumulated	Total	Accumulated
lbs/acre/yr	7.1	4.5	139.7	26.1
grams/m^2/yr	0.80	0.80	15.7	2.9

Vollenweider loading rates for phosphorus (g/m^2/yr) based on the surface area and outflow of Cassadaga Lake:

"Dangerous" (eutrophic rate)	0.62
"Permissible" (oligotrophic rate)	0.31

V. LITERATURE REVIEWED

Anonymous, 1971. Inventory of municipal waste facilities. Publ. No. OWP-1, Vol. 2, EPA, Washington, D.C.

Greeson, Phillip E., and F. Luman Robison, 1970. Characteristics of New York lakes. Part 1 - Gazateer of lakes, ponds, and reservoirs. Bull 68, U.S. Dept. Int. and NY State Dept. Env. Cons., Albany.

Vollenweider, Richard A. (in press). Input-output models. Schweiz. A. Hydrol.

VII. APPENDICES

APPENDIX A

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR NEW YORK 11/26/74

LAKE CODE 3607 CASSADAGA LAKE

TOTAL DRAINAGE AREA OF LAKE 6.02

TRIBUTARY	SUB-DRAINAGE AREA	NORMALIZED FLOWS JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
3607A1	6.02	12.00	13.00	24.00	22.00	11.00	6.20	3.30	2.60	3.20	4.80	7.40	12.00	10.04
3607B1	0.34	0.70	0.70	1.30	1.20	0.60	0.30	0.20	0.10	0.20	0.20	0.40	0.70	0.55
3607C1	0.50	1.00	1.00	1.90	1.70	0.90	0.50	0.30	0.20	0.30	0.30	0.60	1.00	0.81
360701	2.87	5.80	6.10	12.00	10.00	5.10	3.[illegible]	1.60	1.20	1.50	1.90	3.50	5.80	4.78
3607ZZ	2.31	4.50	4.80	9.20	8.20	4.10	2.[illegible]	1.20	1.00	1.20	1.50	2.80	4.50	3.78

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 6.02
SUM OF SUB-DRAINAGE AREAS = 6.32

TOTAL FLOW IN = 119.20
TOTAL FLOW OUT = 120.70

MEAN MONTHLY FLOWS AND DAILY FLOWS

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
3607A1	11	72	18.00	4	30.00				
	12	72	22.00	3	12.00				
	1	73	12.00	1	47.00				
	2	73	12.00	3	54.00				
	3	73	24.00	24	18.00				
	4	73	17.00	5	54.00	30	15.00		
	5	73	12.00	15	9.40	30	16.00		
	6	73	7.10	3	12.00	28	7.10		
	7	73	3.80	30	3.30				
	8	73	2.50	31	2.40				
	9	73	2.70	30	2.30				
	10	73	3.50	15	2.20				
3607B1	11	72	1.00	4	1.60				
	12	72	1.20	3	0.70				
	1	73	0.70	1	2.70				
	2	73	0.60	3	2.90				
	3	73	1.30	24	1.00				
	4	73	0.90	3	0.20	30	0.80		
	5	73	0.70	15	0.50	30	0.70		
	6	73	0.40	3	0.70	28	0.0		
	7	73	0.0	30	0.0				
	8	73	0.0	31	0.0				
	9	73	0.0	30	0.0				
	10	73	0.20	15	0.10				

TRIBUTARY FLOW INFORMATION FOR NEW YORK 11/24/74

LAKE CODE 3607 CASSADAGA LAKE

MEAN MONTHLY FLOWS AND DAILY FLOWS

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
3A07C1	11	72	1.50	4	2.40				
	12	72	1.80	3	1.00				
	1	73	1.00	1	4.00				
	2	73	0.90	3	4.30				
	3	73	1.90	24	1.40				
	4	73	1.30	3	1.70	30	1.20		
	5	73	1.00	15	0.80	30	1.00		
	6	73	0.60	3	1.00	28	0.60		
	7	73	0.10	30	0.0				
	8	73	0.0	31	0.0				
	9	73	0.0	30	0.0				
	10	73	0.30	15	0.20				
3A07D1	11	72	8.50	4	14.00				
	12	72	10.00	3	5.90				
	1	73	5.70	1	23.00				
	2	73	5.40	3	26.00				
	3	73	12.00	24	8.60				
	4	73	7.90	3	10.00	30	6.70		
	5	73	5.60	15	4.40	30	7.80		
	6	73	3.40	3	5.60	28	3.50		
	7	73	1.80	30	1.60				
	8	73	1.30	31	1.10				
	9	73	1.50	30	1.10				
	10	73	1.70	15	1.00				
3A0727	11	72	6.80						
	12	72	8.20						
	1	73	4.40						
	2	73	4.30						
	3	73	9.30						
	4	73	6.50						
	5	73	4.50						
	6	73	2.80						
	7	73	1.40						
	8	73	1.20						
	9	73	1.20						
	10	73	1.30						

APPENDIX B

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 74/11/26

360701
42 20 43.0 079 19 00.0
CASSADAGA LAKE
36 NEW YORK

11EPALES 2111202
3 0030 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3-N TOTAL MG/L	00665 PHOS-TOT MG/L P	00666 PHOS-DIS MG/L P
72/05/26	18	28 0000	20.6	8.8	180	185	8.90	75	0.060	0.070	0.017	0.013
	18	28 0010	19.5	8.8		200	8.90	76	0.060	0.080	0.024	0.014
	18	28 0025	8.7	2.4		230	7.40	93	0.360	0.340	0.028	0.024
72/07/27	19	35 0000			72	180	9.10	70	0.040	0.060	0.017	0.009
	19	35 0004	23.6	6.4		190	9.10	70	0.040	0.050	0.018	0.009
	19	35 0015	13.2	0.4		235	7.50	91	0.030	0.140	0.018	0.009
	19	35 0025	10.1	0.0		240	7.40	100	0.050	0.740	0.060	0.045
72/10/13	10	35 0000			52	200	7.65	83	0.130	0.290	0.037	0.009
	10	35 0004	11.9	7.1		200	7.60	82	0.130	0.310	0.027	0.011
	10	35 0015	11.8	4.8		205	7.45	85	0.120	0.370	0.026	0.011
	10	35 0021	11.6	4.3		205	7.35	85	0.120	0.420	0.044	0.014

DATE FROM TO	TIME OF DAY	DEPTH FEET	32211 CHLRPHYL A UG/L
72/05/26	18	28 0000	1.1J
72/07/27	19	35 0000	21.4J
72/10/13	10	35 0000	6.2J

J VALUE KNOWN TO BE IN ERROR

81

APPENDIX C

TRIBUTARY DATA

STORET RETRIEVAL DATE 74/11/26

3607A1 LS3607A1
42 20 34.0 079 19 00.0
CASSADAGA CREEK
36089 7.5 CASSADAGA
O/CASSADAGA LAKE
ST HWY 424 BRDG
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/11/04	08 50		0.299	0.950	0.378	0.020	0.054
72/12/03	08 10		0.380	0.610	0.130	0.005K	0.025
73/01/01	08 10		0.470	0.420	0.090	0.005K	0.016
73/02/03	08 00		0.550	0.360	0.032	0.005K	0.020
73/03/24	08 00		0.540	0.460	0.011	0.005K	0.025
73/04/05	08 00		0.399	0.400	0.017	0.006	0.025
73/04/30	08 10		0.260	0.500	0.017	0.005K	0.020
73/05/15	08 00		0.250	0.530	0.021	0.005K	0.022
73/05/30	08 00		0.230	1.300	0.063	0.009	0.020
73/06/03	08 10		0.035	2.700	0.066	0.012	0.035
73/06/28	08 10		0.022	1.300	0.023	0.008	0.025
73/07/30	08 10		0.029	0.750	0.011	0.005K	0.030
73/08/31	08 00		1.920	0.690	0.030	0.006	0.025
73/09/30	08 10		0.030	1.050	0.063	0.008	0.035
73/10/15	08 10		0.037	1.000	0.340	0.015	0.060

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 74/11/26

360741 LS3607R1
42 20 30.0 079 19 30.0
UNNAMED CREEK
36 7.5 CASSADAGA
T/CASSADAGA LAKE,
FRISHEE RD BRDG S OF COUNTRY CLUB
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/11/04	09 05		0.380	0.700	0.110	0.008	0.019
72/12/03	08 30		0.470	0.100K	0.019	0.005K	0.005K
73/01/01	08 30		0.510	0.290	0.029	0.005K	0.005K
73/03/24	08 30		0.520	0.100K	0.009	0.005K	0.005K
73/04/03	08 20		0.390	0.120	0.012	0.005K	0.005K
73/04/30	08 20		0.690	1.000	0.046	0.011	0.060
73/05/15	08 20		0.390	0.240	0.005K	0.005K	0.030
73/05/30	08 10		0.310	0.270	0.017	0.007	0.040
73/06/03	08 20		0.360	0.980	0.020	0.013	0.095
73/10/15	08 20		0.240	0.400	0.040	0.006	0.025

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 74/11/26

3607C1 LS3607C1
42 20 30.0 079 19 30.0
UNNAMED CREEK
36 7.5 CASSADAGA
T/CASSADAGA LAKE
FRIS8EE RD BRDG N OF COUNTRY CLUB
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/11/04	09	10	0.290	0.450	0.072	0.005K	0.005K
72/12/03	08	40	0.390	0.100K	0.014	0.007	0.007
73/01/01	08	20	0.450	0.100K	0.009	0.005K	0.005K
73/02/03	08	15	0.450	0.270	0.007	0.005K	0.030
73/03/24	08	40	0.440	0.100K	0.009	0.005K	0.005K
73/04/03	08	28	0.490	0.100K	0.005K	0.005K	0.005K
73/04/30	08	30	0.430	0.560	0.025	0.005K	0.015
73/05/15	08	30	0.330	0.100K	0.008	0.005K	0.010
73/05/30	08	20	0.273	0.540	0.019	0.005K	0.005K
73/06/03	08	00	0.270	1.150	0.032	0.006	0.010
73/06/28	08	30	0.350	0.460	0.012	0.007	0.020
73/10/15	08	40	1.040	0.450	0.078	0.005K	0.005K

K VALUE KNOWN TO BE
LESS THAN INDICATED

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STORET RETRIEVAL DATE 74/11/26

3607D1 LS3607D1
42 21 00.0 079 19 00.0
UNNAMED CREEK
36 7.5 CASSADAGA
T/CASSADAGA LAKE
ST HWY 60 BRDG
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/11/04	08 30		0.440	0.300	0.086	0.006	0.010
72/12/03	08 00		0.840	0.100K	0.018	0.006	0.008
73/01/01	08 00		1.010	0.100K	0.010	0.005K	0.011
73/02/03	08 00		0.990	0.130	0.015	0.005K	0.010
73/03/24	08 50		0.980	0.190	0.011	0.005K	0.010
73/04/03	08 10		1.360	0.150	0.006	0.005K	0.010
73/04/30	08 00		0.252	0.960	0.064	0.008	0.057
73/05/15	08 10		1.160	0.480	0.037	0.005K	0.015
73/05/30	08 35		0.510	0.960	0.017	0.005K	0.040
73/06/03	08 40		1.680	1.150	0.021	0.005K	0.012
73/06/28	08 00		2.060	0.970	0.054	0.030	0.050
73/07/30	08 00		2.300	0.150	0.013	0.005K	0.015
73/08/31	08 20		0.014	1.470	0.014	0.007	0.115
73/09/30	08 00		1.960	0.120	0.036	0.010	0.030
73/10/15	08 00		0.580	0.575	0.031	0.006	0.025

K VALUE KNOWN TO BE
LESS THAN INDICATED

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